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ABSTRACT

An explicit definition of a geometric object is converted into a level set which implicitly defines the geometric object. The explicit definition is converted to a form for efficient ray casting. Magnitude and sign values are assigned to a grid of voxels using ray casting in which the magnitude value represent a minimum distance from the voxel to th object and the sign value defines whether the voxel is inside or outside the object. The magnitude and sign values may be removed of discontinuities and smoothed before an accurate level set implicitly defining the object is achieved. Run length encoding may be applied to define a sparse level set in which consecutive voxels having identical values are compressed into a single value including a marker to indicate a quantity of the consecutive voxels.